

# Hydrologic Modeling

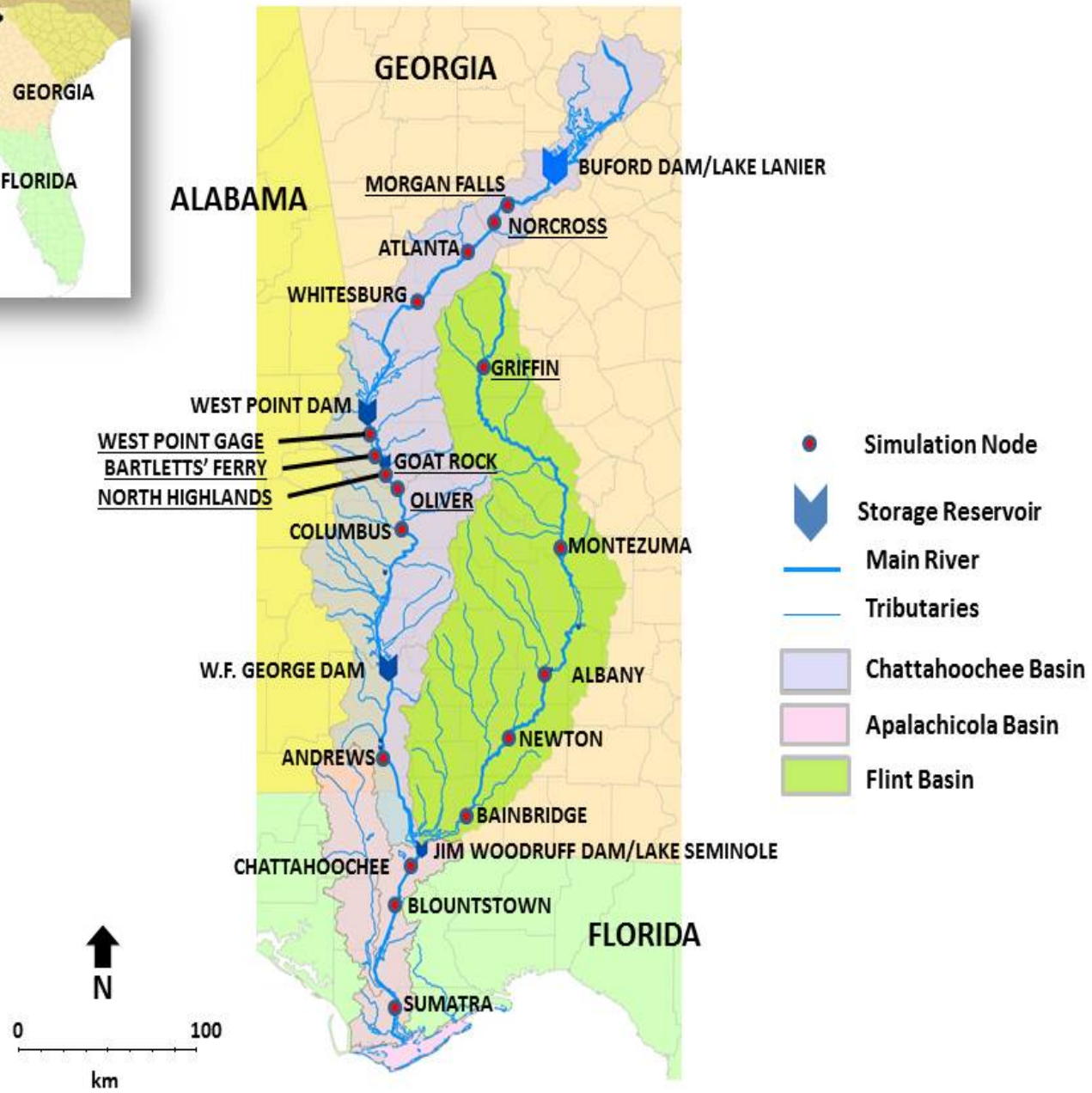
ABSI CAB 01/08/2020

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# How hydrologic modeling this fits in the bigger ABSI picture

- **Hydrologic model**
  - **Climate, water use & water mgmt. → water, nutrients entering bay**
- Hydrodynamic model
  - Water entering bay → water qual. throughout bay
- Oyster model
  - Water, mgmt., restoration → oyster populations and fisheries



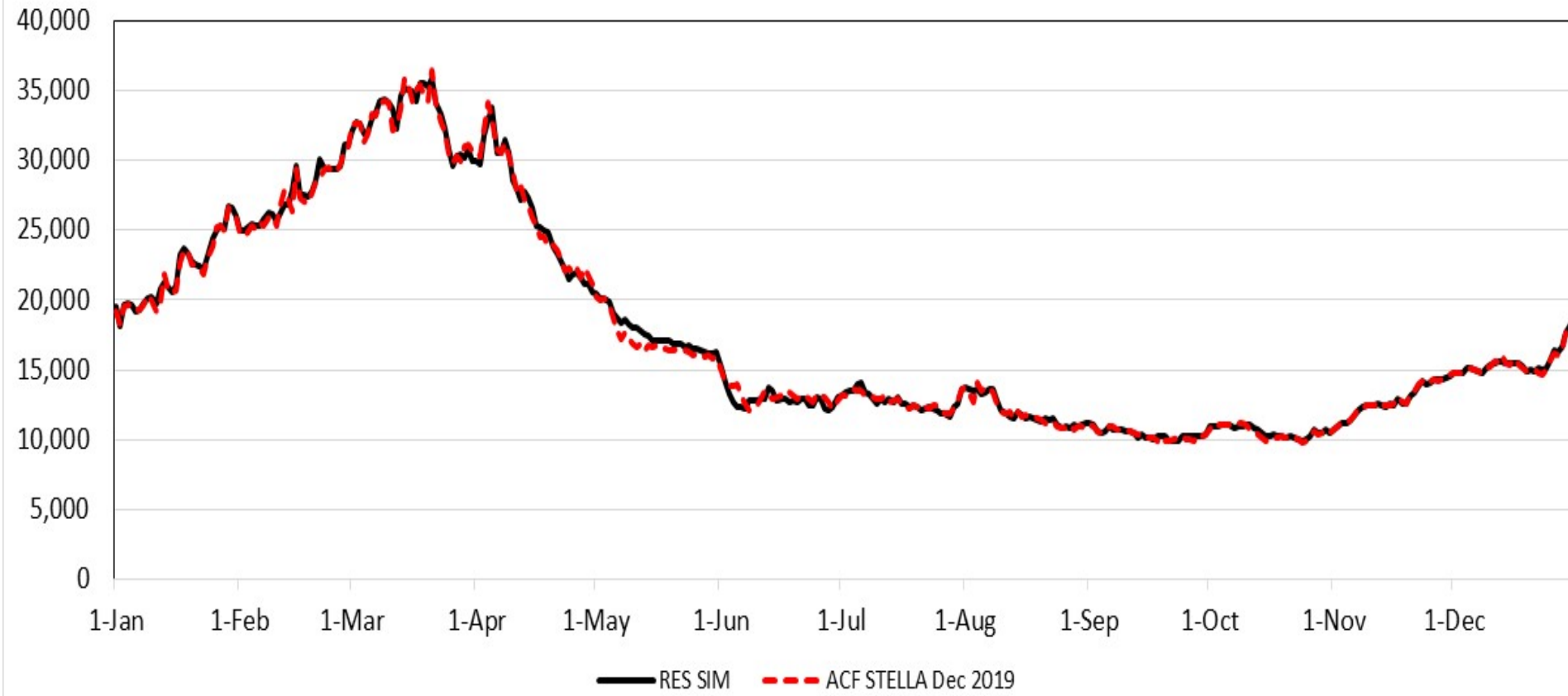
# Introduction to Hydrologic Modeling

- In doing hydrologic modeling in the ABSI project the intent is to define potential freshwater inflow to the estuary consistent with the storage capacity of the reservoir system, consumptive demand management in the watershed and alternative climate scenarios.
- The approach to addressing freshwater inflow to the Apalachicola estuary will be to use of an existing watershed model of the basin. Modeling will be done in STELLA, a model originally developed in ACF Comprehensive Study and updated to represent the current management approach to the ACF basin by me.
- The managing entity for the reservoirs in the ACF watershed is the U.S. Army Corps of Engineers, Mobile District and they utilize a separate watershed modeling tool: HEC ResSim

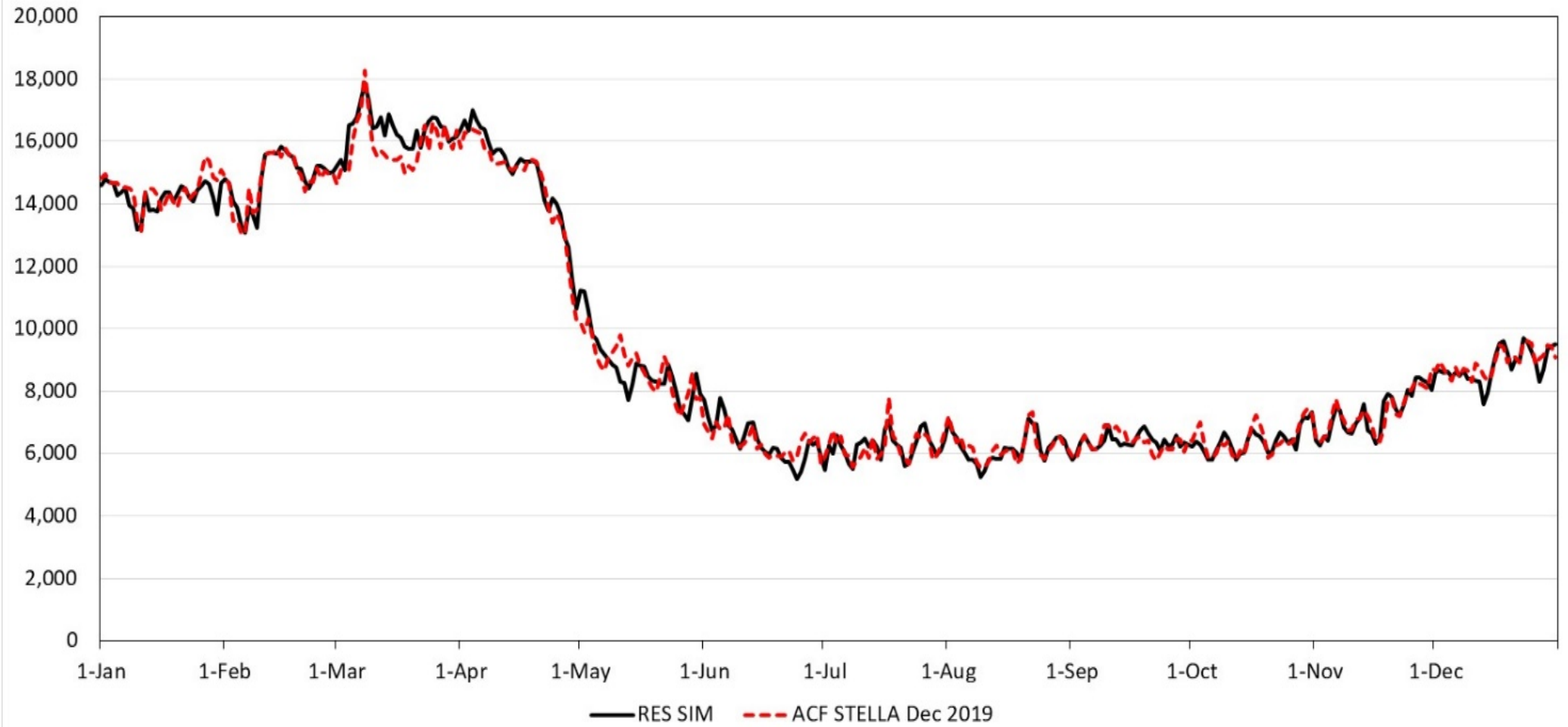
# Introduction to Hydrologic Modeling

- The current guidelines for managing the watershed are defined by the 2016 Water Control Manual.
- I have been working on a project funded by the U.S. Fish and Wildlife Service comparing the outputs from STELLA and HEC ResSim models.
- The following slides show the status of this comparison for the outflow from Jim Woodruff Dam outflow (the control structure closest to the Apalachicola estuary) for 1939 to 2012.
- Work is still being done to make the outputs match even closer.

## JW OUTFLOW MEDIAN



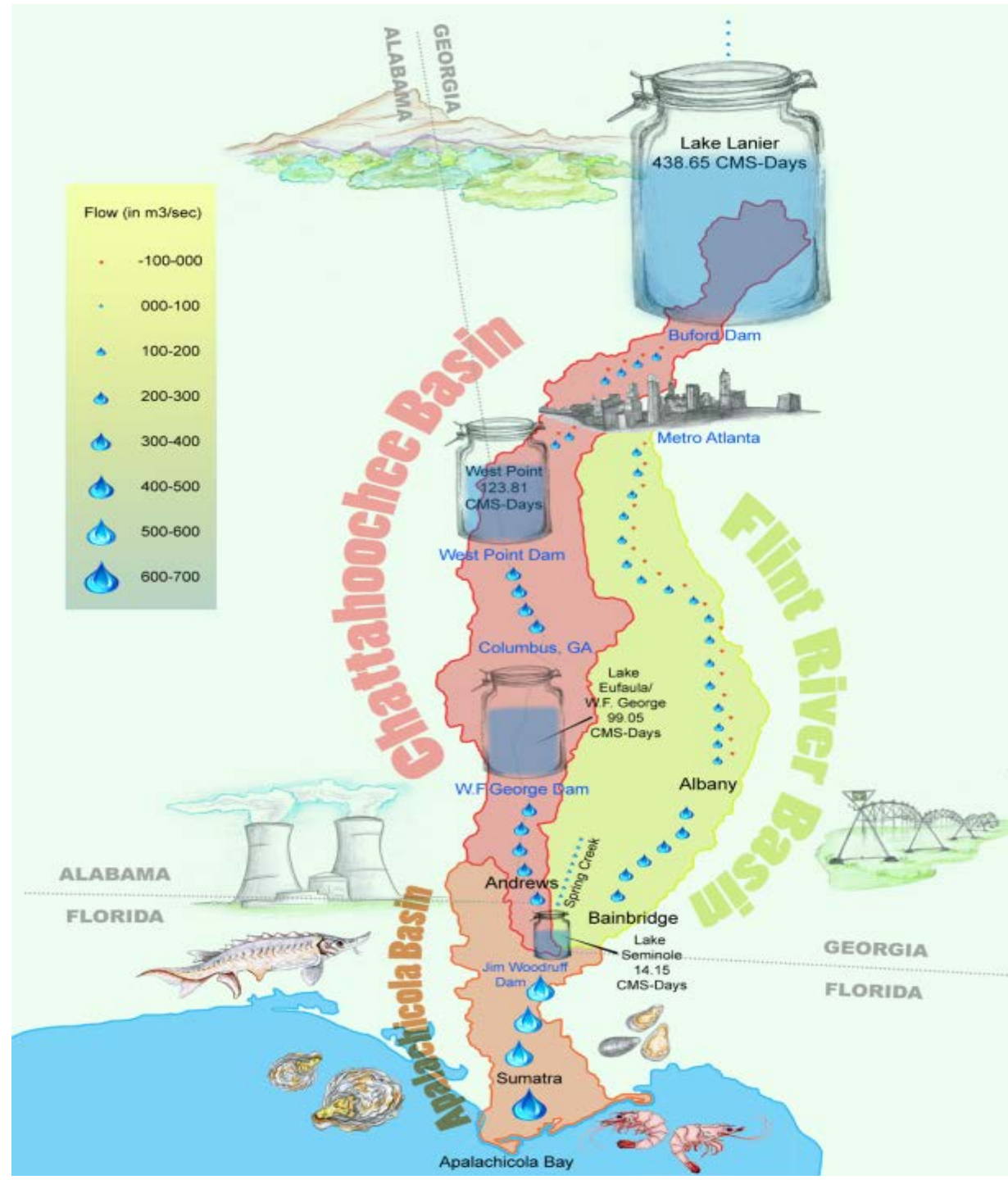
### JW OUTFLOW 90% exceeded



# Introduction to Hydrologic Modeling

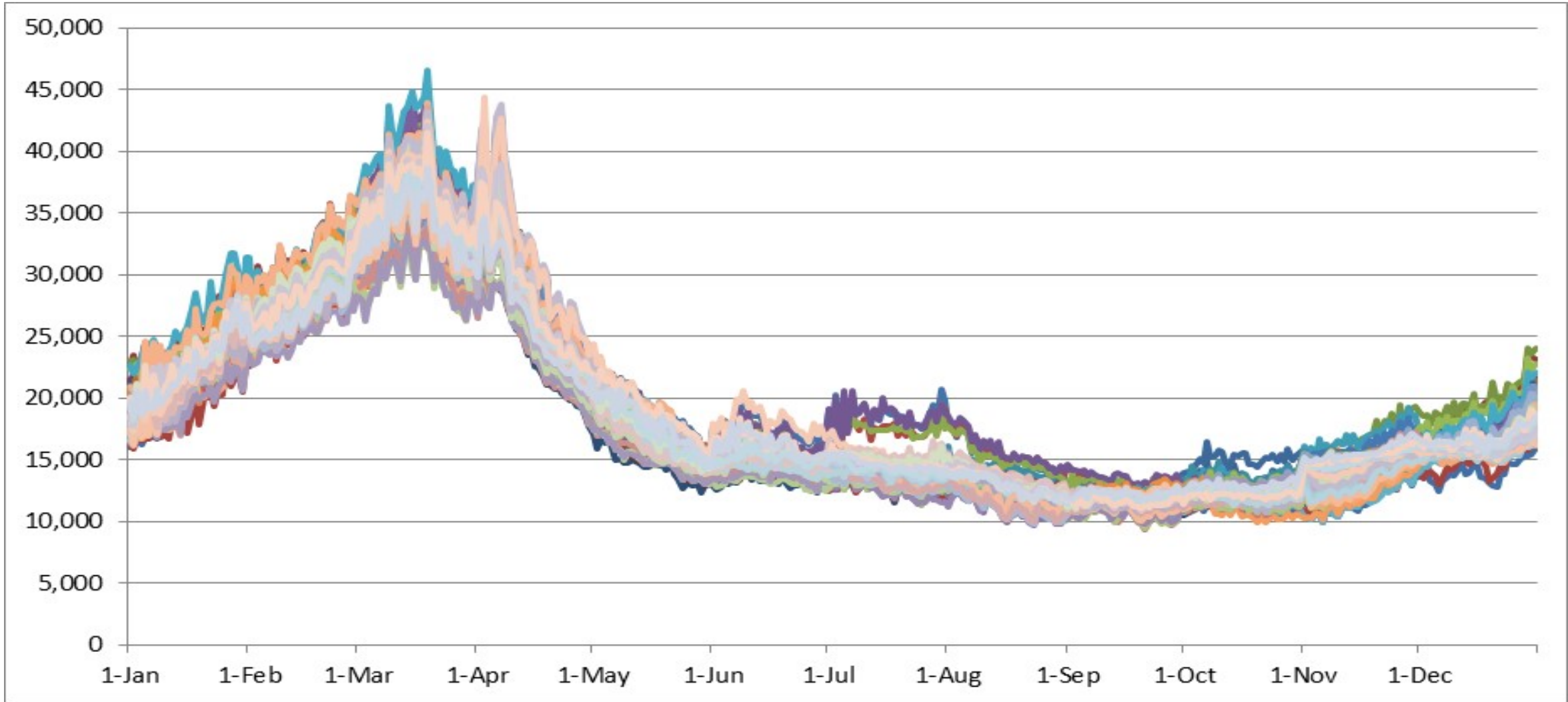
- My reasons for using the STELLA model instead of the ResSim model are:
  - The run-time for the STELLA model for the 73 year record used in the models is less than 15 seconds, compared to over 2-hours for the HEC ResSim model. This reduced run-time allows for the analysis of a greater array of management scenarios and to integrate an array of alternate climate scenarios into the modeling,
  - The STELLA model is a far more flexible modeling tool which allows for me to consider a greater array of management alternatives.



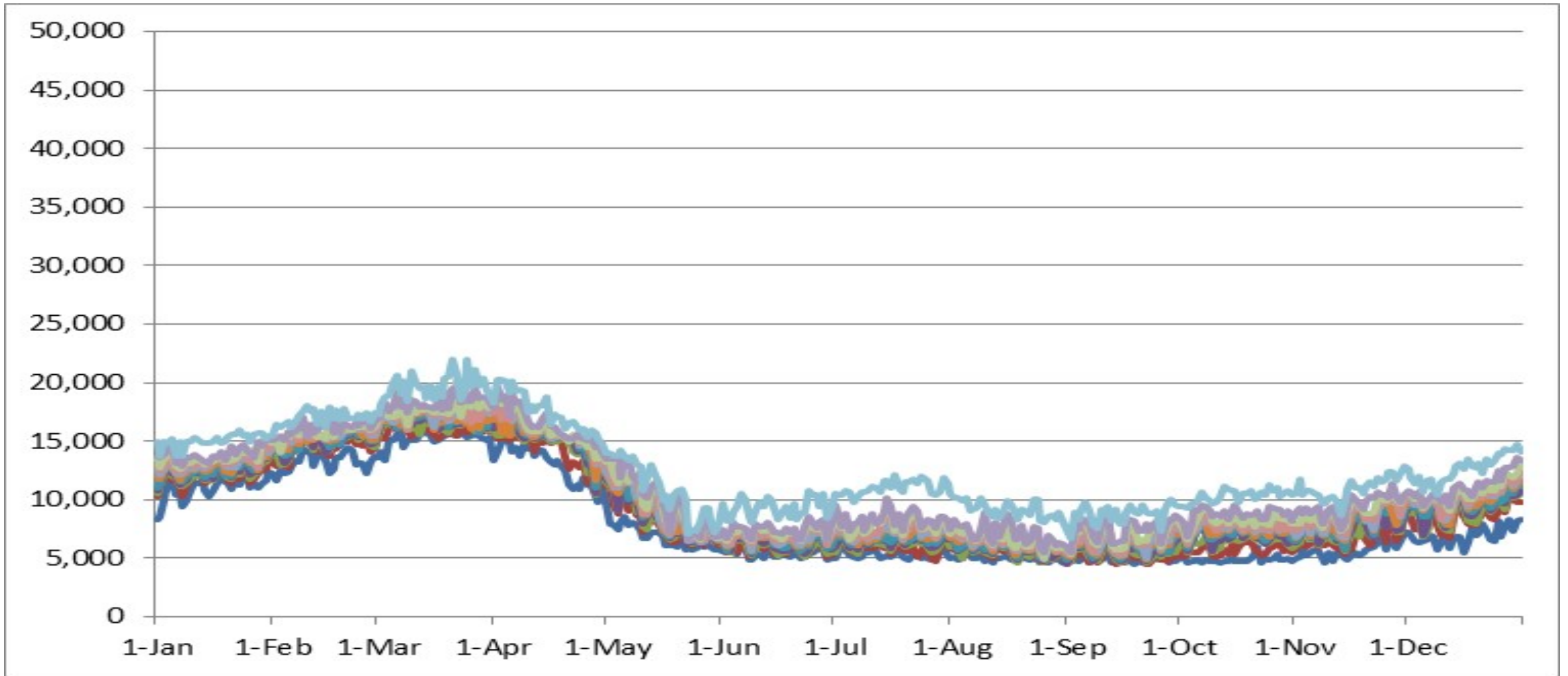


# Climate change

- In reviewing the preceding slide, it is apparent that flows into the Apalachicola are defined more by climate than by management of the storage reservoirs in the ACF basin.
- The following slides show a comparison of modeled outflows for 96 separate downscaled climate models for the ACF basin using the previous reservoir management approach for the watershed (RIOP #2) and identical demands. I am in the process of doing a similar set of charts for the current management approach with Dr. Lydia Stefanova.



Median Jim Woodruff outflows with RIOP operation and alternate climate



90% Exceeded Jim Woodruff outflows with RIOP operation and alternate climate

# Conclusion

In concluding I would like to:

- 1) ask the CAB what role they would like to play in the hydrologic modeling effort
- 2) if there are any comments on what will be done to address the hydrologic modeling.

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